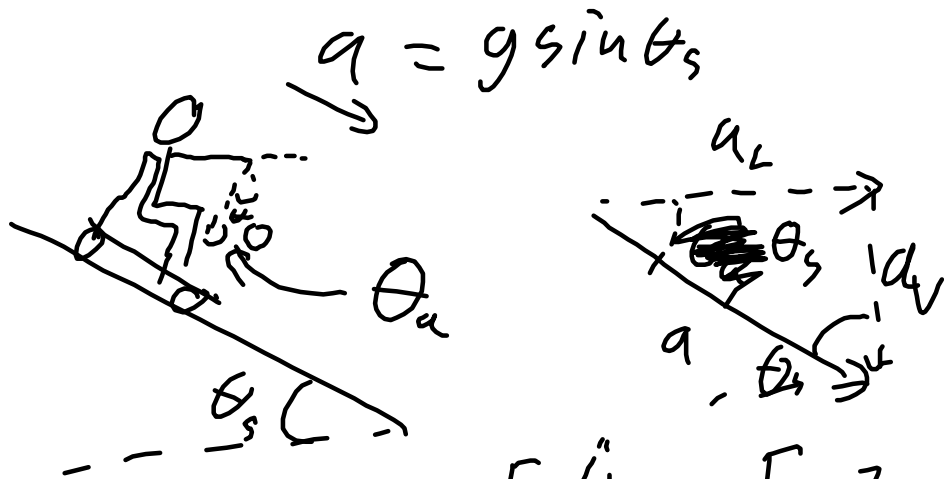


Playland prep

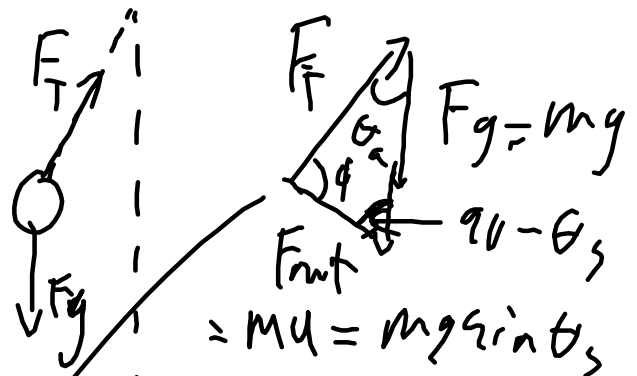
Q3

a)



$$\tan \theta_s = \frac{a_L}{a}$$

$$a_L = g \sin \theta_s \tan \theta_s$$



$$\frac{\sin \phi}{mg} = \frac{\sin \theta_a}{mg \sin \theta_s}$$

$$\phi = 180 - (90 - \theta_s) - \theta_a$$

$$\sin \theta_a = \sin \theta_s \sin \phi$$

$$\sin \theta_a = \sin \theta_s \sin (90 + \theta_s - \theta_a)$$

$$\theta_s = \theta_a \quad \phi = 90$$

$$b) \quad \cancel{m}gh = \frac{1}{2} \cancel{m}v^2$$

$$\sqrt{2(9.8 \times 20)} = v = \underline{19.6 \text{ m/s}}$$

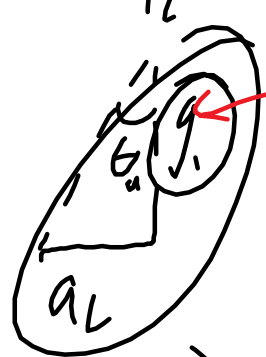
$$\cos 30^\circ = \frac{a_L}{4.9}$$

$$4.9 = g \sin \theta$$

$$a_v = g \sin^2 \theta$$

$$q_L = 4.9 \cos 30^\circ$$

$$g - a_v$$

$$\sin \theta_1 = \frac{q_L}{g}$$


$$\sin \theta_a = \frac{g \sin \theta_s \cos \theta_s}{g}$$

$$\sin \theta_a = \frac{1}{2} \sin 2\theta_s$$

$$\theta_a = \sin^{-1} \left(\frac{1}{2} \sin 60^\circ \right)$$

$$= 25.6^\circ$$

missing that the vertical pull on the bob is not g , you are partially in free

fall, so $a_v = g - g \sin^2 \theta_2$

$$\tan \theta_a = \frac{a_L}{a_v} = \frac{g \sin \theta_s \cos \theta_s}{g - g \sin^2 \theta_s}$$

$$\tan \theta_a = \frac{\sin \theta_s \cos \theta_s}{1 - \sin^2 \theta_s}$$

$$\tan \theta_a = \frac{\sin \theta_s \cos \theta_s}{\cos^2 \theta_s}$$

$$\tan \theta_a = \tan \theta_s$$

$$\boxed{\theta_a = \theta_s}$$

$$1/11 = 0.0909$$

$$365 \times 24 \times 3600 = 31536000$$

$$1.4/3.15 = 0.4444$$

$$1.4 \times 31536000 = 44150400$$

$$44150400 \times 1E-11 = 0.0004$$

